s substitute its value lz; then $t=\frac{x}{l}-lz+40$. When $t=0$, $x=320$, and $z=320$.

$$\therefore 0=\frac{320}{l}-320l+40, \text{ and } l=1.0644+. \quad s=lz=1.0644\times320=340.$$

624+, the distance in rods that the hound runs.

Also solved by *A. L. FOOTE*, *P. S. BERG* and *F. P. MATZ*.

35. **Proposed by H. C. WHITAKER, B. S., C. E., Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.**

At the rate of 10 cubic inches per second, water is running into a vessel in the shape of a right conic frustum, the radii of whose upper and lower bases are respectively 15 and 10 inches, and whose altitude is 20 inches. At what rate per second is the *depth* of the water increasing, when *it* is exacuy 8 inches?

I. **Solution by J. C. NAGLE, M. A., M. C. E., Professor of Civil Engineering, A. and M. College, College Station, Texas, and ALFRED HUME, C. E., D. Sc., University of Mississippi.**

Represent the depth and the volume of water at any instant by h and V respectively. The radius of the free surface of the water will be $10+\frac{h}{4}$.

Therefore $V=\frac{\pi}{3}h\left[100+\left(10+\frac{h}{4}\right)^2+10\left(10+\frac{h}{4}\right)\right]$.

Differentiating, $dV=\frac{\pi}{3}(300+15h+\frac{3}{16}h^2)$. Substituting for dV and h 10 and 8 respectively, $dh=\frac{5}{72\pi}$, or the depth is increasing at the rate of $\frac{5}{72\pi}=0.02210484+$ of an inch per second.

[This result may also be obtained as follows: The area of the free surface of the water at the instant under consideration is 144π. Therefore the depth is increasing at the rate of $\frac{10}{144\pi}$ inches per second.]

II. **Solution by Professor J. F. W. SCHEFFER, A. M., Hagerstown, Maryland.**

Let the radii of upper and lower bases be a and b, the altitude$=h$, $x=$ the distance of water from the lower base after the time t, y the radius of section at the distance x; then, denoting by c the quantity of water flowing in per second, $\pi y^2dx=cdt$.

$$\therefore \frac{dx}{dt}=\frac{c}{\pi y^2}=\frac{ch^2}{\pi[(a-b)x+bh]^2}.$$

For the given numerical values, we have $\frac{dx}{dt}=\frac{5}{72\pi}=$required rate at distance $=8$.

Also solved by *P. S. BERG*, *F. P. MATZ* and *E. L. SHERWOOD*.